

<https://helda.helsinki.fi>

Governing urban sustainability transitions : urban planning regime and modes of governance

Nieminen, Jenni

2021-03-21

Nieminen , J , Salomaa , A & Juhola , S 2021 , ' Governing urban sustainability transitions : urban planning regime and modes of governance ' , Journal of Environmental Planning and Management , vol. 64 , no. 4 , pp. 559-580 . <https://doi.org/10.1080/09640568.2020.1776690>

<http://hdl.handle.net/10138/332617>

<https://doi.org/10.1080/09640568.2020.1776690>

acceptedVersion

Downloaded from Helda, University of Helsinki institutional repository.

This is an electronic reprint of the original article.

This reprint may differ from the original in pagination and typographic detail.

Please cite the original version.

Jenni Nieminen, Anna Salomaa & Sirkku Juhola (2020): Governing urban sustainability transitions: urban planning regime and modes of governance, Journal of Environmental Planning and Management, DOI: 10.1080/09640568.2020.1776690
Author's accepted manuscript/final draft version for Helsinki University Library

Governing urban sustainability transitions: Urban planning regime and modes of governance

Jenni Nieminen¹, Anna Salomaa^{1,2}, Sirkku Juhola^{1,2*}

¹ Ecosystems and Environment Research Programme, Faculty of Biological and Environmental Sciences, University of Helsinki, Finland

² Helsinki Institute of Sustainability Science (HELSUS), Finland

* Corresponding author: sirkku.juhola@helsinki.fi

Abstract

There is an increasing need for urban sustainability transitions, though empirical cases that focus on the governance of these processes over time are not plentiful. This study addresses that gap by examining the governance of an urban transition in an eco-neighbourhood in Helsinki using the framework of a multi-level perspective on socio-technical transitions and modes of governance. This study shows how policy instruments and the urban planning regime have changed from the start of the planning in 1994 to 2018 and how the different dimensions of the urban planning regime have enabled or constrained the sustainability transition based on document analysis and semi-structured expert interviews. As for the modes of governance, regulation and collaboration were most widely used. The plot assignment stipulations that contained sustainability requirements, as well as the collaborative area working group method, have since been scaled up citywide. This study concludes that more process-focused policy instruments are needed.

Keywords: urban planning, multi-level perspective, land use, modes of governance

1. Introduction

Profound sustainability transitions are needed in cities (O'Brien and Sygna 2013). The challenge of urban sustainability is well-recognised by city governments (van der Heijden et al. 2019; Shane and Graedel 2000), which initiate ever more ambitious agendas and programmes for mitigating climate change and addressing other environmental issues (Frantzeskaki et al. 2017). Cities have been described as hotbeds for innovation and experimentation, places where novel urban sustainability solutions can emerge (Heiskanen et al. 2015; Loorbach and Shiroyama 2016). Urban governance, as a way to steer transitions, can be understood as a collection of different working arrangements that involve both formal governmental and informal nongovernmental actors that together steer the development of urban areas (Hendriks 2014). Because many types of actors are involved in the development of urban areas (see e.g. Frantzeskaki et al. 2017; Loorbach and Shiroyama 2016), the policy instruments used in different modes of governance are also diverse, being both formal and informal.

The governance of urban sustainability transitions must deal with a high degree of complexity through the challenge of aligning the multiple sectors of the society towards sustainability (Frantzeskaki et al. 2017). An urban area's social systems consist of different kinds of routines, cultures, ideals and social groups that have a tendency to lean towards the status quo, even if the need for profound change is apparent (Loorbach and Shiroyama 2016). Furthermore, the inertia of existing infrastructure and technology makes urban transitions gradual processes (Næss and Vogel 2012). So far, city governments have begun to govern the change process into profound and systemic sustainability change (Loorbach and Shiroyama 2016), and the role of city authorities in governing transitions is shown to be important (Mukhtar-Landgren et al. 2019, Kivimaa et al. 2019). However, empirical examples of governance of transitions are not plentiful. There are many reasons that contribute to this, for example the lack of horizontal and vertical collaboration, vested interests, technocratic solutions or lack of capacity (Hölscher 2019).

There has been a growing amount of research on urban sustainability transitions (see e.g. Frantzeskaki et al. 2017; Hodson and Marvin 2010; Loorbach and Shiroyama 2016; Næss and Vogel 2012), but we identify two gaps in the literature, one theoretical and one empirical. First, while there are studies that examine the governance of urban transitions (Ernstson et al. 2010, Loorbach et al. 2016, Swilling and Hajer 2017), the focus on modes of governance and their interaction with the dynamics of transitions is still limited. Secondly, as calls for urban transitions increase, there are relatively few examples of what this means in practice (Ernst et al. 2016). We argue that this is because many studies do not analyse the role of governance in this change over longer periods of time. Thus there is a need for more empirical case studies.

Empirically, our paper examines the developments in urban planning in the City of Helsinki through the case example of the Eko-Viikki neighbourhood between 1994 and 2018 by using key informant interviews and policy document analysis. We pose the following two research questions: first, what modes of governance were used in the case of Eko-Viikki? Second, how have the different

dimensions of the urban planning regime, technology, policy, culture and markets, enabled or constrained a sustainability transition in Helsinki?

To answer these questions, the theory of multi-level perspective (MLP) on socio-technical transitions is used (Geels 2004) with a focus on the modes of governance and types of policy instruments used in steering these transitions. In Section 2 of this paper, we review previous literature on urban sustainability transitions, focusing on the role of governance and policy instruments, and present the analytical framework. In Section 3, we introduce the materials and methods used in the research. The results of the research are presented in Section 4, after which the results are discussed in Section 5 and we present our conclusions in section 6.

2. Urban sustainability transitions and multi-level governance

2.1 Multi-level perspective on urban transitions

Transitions have been defined as profound and structural system changes, where a society or its sub-system changes remarkably (Geels 2002; Rotmans et al. 2001; Loorbach and Shiroyama 2016). The appeal of a multilevel perspective lies in its nested framework that can be used to explain stability or change through nested scales of interaction. Three nested levels, niche, regime and landscape, constitute a socio-technical system over time (Geels 2011). Niches are defined as spaces for innovation that are shielded from dominant rules, thus offering an opportunity to challenge them. Regimes are hegemonic system that constitutes the rules and encompass the dominant technologies, institutions and actors. Finally, landscape is considered to be the context, for example long-running economic and political trends and events.

Although initially developed to account for changes in socio-technological systems, the MLP has been extended to analyse changes in cities (Geels 2010). Urban sustainability transitions, however, differ in many ways from the sector-specific transition approach that was previously the main focus in the sustainability transition literature. They are multi-sector transitions that require all the different sectors of urban society to become realigned, as well as different dimensions of technologies and infrastructure, governance and institutional frameworks, cultural environment and residents' lifestyles (Frantzeskaki et al. 2017).

As the regime level is the target of the transition (Geels 2011), a clarification of the meaning and structure of the regime should be made. A regime is a compilation of dominant structures, practices and culture in a specific societal system (Loorbach and Shiroyama 2016). Regimes are composed of different dimensions of policy, markets, science, technology and culture that are, in turn, coordinated by multiple sub-regimes including their own dynamics (Geels 2011). However, the dimensions are also dependent on each other and therefore evolve together (Geels 2011).

Thus, regimes have also been described as 'semi-coherent sets of rules, which are linked together' (Geels 2004). The connection between the rules allow efficient coordination of activities inside the

regime and, therefore, provide its stability (Geels 2004; Geels and Schot 2007). On the other hand, this alignment among the rules and stability of the regime makes it difficult to generate a transition (Geels 2004; Geels and Schot 2007). The dominant regulations, consumption patterns, policy priorities and investment resolutions are intertwined with each other through the interests and decision-making of the regime actors (Geels and Schot 2007). Hence, changing a rule can require alteration of other rules as well (Geels 2004). Therefore, regimes have the tendency to follow dominant trajectories (Geels and Schot 2007). Also, technological path-dependencies, for example, also contribute to the tendency of regimes to follow dominant trajectories. Niches, on the other hand, act as locations for learning processes that create novel solutions that differ from the existing rules of the regime (Geels 2004).

The MLP has traditionally focused on describing transitions where a singular niche innovation struggles to break through into the incumbent regime (Hodson et al. 2017). This niche-driven typology is argued to downgrade the agency of regime actors in transitions (see e.g. Quitzau et al. 2013; Smith et al. 2004). Instead, sustainability transitions are a multi-actor process (Daneri et al. 2015, Frantzeskaki et al. 2017). The need to develop more agency-oriented transition perspectives is particularly important in urban sustainability transitions since there are indications that urban governments, as regime incumbent actors, do make conscious and planned efforts to change the regime (see e.g. Hodson and Marvin 2010; Quitzau et al. 2013). Within this, power-relations between actors becomes crucial (Avelino and Wittmayer 2016).

2.2 Modes of governance

Governance, defined as the reallocation of authority upward, downward and sideways from the central state (Hooghe and Marks 2003), has become the dominant way of understanding collective decision-making in cities (McCann 2017). Also, the governance of urban transitions has been conceptualised as taking place in the multi-level settings (Bulkeley and Betsill 2005) with decision-making power distributed to multiple levels and scales (Hodson and Marvin 2010). In urban governance, formal decision-making bodies still have a significant role as does the state, but a city government is not the only actor in the city (McCann 2017).

Key issues in multilevel governance are the actors involved in it (i.e. the politics), the institutional set up (polity), and the emergence and use policy instruments (policy) (Treib et al. 2007). These dimensions of governance, defined as ‘forms of realising collective goals by means of collective action’ (Lange et al. 2013, 407), constitute the governance arrangements that emerge through the interplay of these three dimensions of politics, polity and policy.

Actors are central to the politics dimensions, operating in urban governance and having their own, and often clashing, interests (Hendriks 2014). When analysing urban governance systems, it is important to recognise who has the power to control and change the cities – their infrastructural and societal systems (see e.g. Hodson and Marvin 2009; Næss and Vogel 2012). Sustainability transitions concern multiple stakeholder groups from construction developers, nongovernmental organisations to residents, and a variety of different epistemic communities, such as planners, engineers and policy

analysts (Joss 2011). Therefore, various different agents, outside and within the city governments, redefine, reshape and re-enact the urban environment constantly (Loorbach and Shiroyama 2016; Bai et al. 2016; Bulkeley 2010).

The second dimension, the polity, is often defined as the institutional framework that sets the context for action, which is constantly changing (Lange et al. 2013). Given these circumstances, the priorities of urban sustainability are negotiated into decisions in complex governance structures (Joss 2011; Bai et al. 2016). Formal government policy has the opportunity to influence the direction, speed and scale of the transitions to a certain extent but not entirely to control them (Rotmans et al. 2001). For example, Næss and Vogel (2012) claim that friction between city administration and private market interests is apparent in present-day cities and this moulds the institutional context that decisions are made in.

Finally, governance of urban sustainability transitions is said to require new tools for steering the process (Loorbach and Shiroyama 2016). This third dimension of policy, steering or policy instruments, are used in executing and implementing policy decisions. Policy instruments can be categorised in different ways. A common classification of environmental policy instruments categorises instruments into regulations, economic instruments and informational instruments (Vedung 1998).

Based on these three dimensions of politics, polity and policy, a distinction is often made between hierarchical and non-hierarchical governance modes (Treib et al 2007), between hierarchical, co- and self-governance (Kooiman 2003) or between centralised governance, decentralised governance, public–private governance, interactive governance, or self-governance (Lange et al. 2013). More recently, different types of network instruments have emerged that further diversify the role of the actors involved (Khan 2015). An important feature of this new mode is that actors and the activities they undertake within their networks can become inter-dependent, placing increasing emphasis on co-operation in both the design and implementation of policy (Khan 2015). These three modes of governance, hierarchy, market and network co-exist and result in a mix of different types of policy instruments used in parallel.

2.3 Analytical framework

In order to conceptualise the complexity of governance and the modes of governance enabling an urban sustainability transition, this study uses the MLP as a conceptual starting point (see e.g. Geels 2002). The MLP has been combined here with a focus on governance instruments because the governance of urban sustainability transitions is considered to require new tools for steering the process (Loorbach and Shiroyama 2016). These policy instruments are understood to emerge within the different modes of governance and thus help shed light on how urban transitions can be enabled through governance. To operationalise this, three issues need to be joined together to form an analytical framework, namely the urban regime, modes of governance, and their dynamic interaction.

First, in this study, the urban regime is considered to be composed of different dimensions, namely of policy, markets, science, technology and culture, based on the classification by Geels (2002). We acknowledge that the landscape level is an important aspect of transitions but have not included it here in this analysis due to our main focus on the regime level in this study. Here we explicitly define the regime to be the dominant system of urban planning in our case area, while we consider the Eko-Viikki to be the niche in our case. Furthermore, this paper adopts the position of Raven et al. (2012); the regime represents a mode of structuration, i.e. it becomes formed through dynamic interaction, which we consider to be through different modes of governance.

Second, modes of governance, on the other hand, are most visible in the policy instruments that are employed. These are classified into three broad categories, based on their hierarchical, market or network orientation (Tenbensen 2005). Within the hierarchical mode, regulations are policy instruments that aim to guide behaviour by adjusting the options open to actors (Mickwitz 2003). Regulations include instruments such as zoning, standards, permits, bans and use restrictions (Mickwitz 2003). They have also been named 'command and control' instruments. The market mode of governance includes economic instruments that focus on altering the costs and benefits of certain actions to the actors by means of, for example, taxes and charges, permit markets (e.g. emission trade markets), grants and subsidies (Mickwitz 2003). The network mode of governance includes, among other voluntary instruments, informational ones. They aim to change actors' attitudes towards environmental issues – the significance of the issues are rated and it is determined whether they are set as a priority (Mickwitz 2003). Information can be knowledge about the policy instruments used or about a policy instrument on its own (Vedung 1998). Informational instruments include, for example, all kinds of campaigns and trainings that disseminate information, as well as different certification and environmental management systems (Mickwitz 2003). The chosen classification is based on the degree of authoritative force involved in the action (Mickwitz 2003).

Finally, understanding the dynamics of change is at the centre of frameworks that have been inspired by the MLP. According to the MLP, pressure can come from both the slowly changing socio-technical landscape in the dominant regime and from niche innovations building up internal momentum in order for a transition to occur (Geels and Schot 2007). Here, the dynamics are considered to emerge from an interplay between the dimensions that constitute the regime itself as well as the modes of governance that emerge. This is in line with the idea of Raven et al. (2012), who argue that the dynamics are explained by both interactions between modes of structuration and developments over time, as well as by interactions between actors and institutions. The more prevalent hierarchical modes are in this change, the more it suggests that governmental actors have an important role to play in transitions

3. Methodology: the Eko-Viikki neighbourhood and urban planning in Helsinki

Case study research is particularly suitable for research focused on understanding complex and bounded social phenomena in-depth while keeping a real-world perspective (Yin 2014). Here, our case is urban planning in Helsinki and the unit of analysis is the case of the Eko-Viikki

neighbourhood. In terms of the MLP framework, the niche level is considered to be the Eko-Viikki neighbourhood, and the regime is defined as the urban planning regime of Helsinki, consisting of land use and construction activities inside the city and at the national level, as well as, for the relevant parts, the international level of European Union (EU) governance that affects the urban planning regime of Helsinki.

The Eko-Viikki neighbourhood in Helsinki is the first neighbourhood in Finland that has been designed according to sustainability criteria (Helsingin kaupunki and Ympäristöministeriö 2004). The city of Helsinki owned the land where Eko-Viikki was built and began the planning and construction in 1994 (Helsingin kaupunki and Ympäristöministeriö 2004). In 2016, there were 1,788 residents living in the Eko-Viikki area (SeutuCD 2018). The planning department outlined that the objective of the development was to experiment with new sustainable planning and building solutions that would reduce the carbon footprint of the construction, as well as the number of resources used and, ultimately, waste produced in the process (Kaupunginsuunnitteluvirasto 2004). At the same time, the aim was to provide a healthy and pleasant living environment by using community buildings and green areas with gardening plots (Helsingin kaupunki and Ympäristöministeriö 2004).

The approach to data collection, document analysis and semi-structured key informant interviews, was influenced by data triangulation (Denzin 2007). The use of multiple sources of data was chosen here as a relevant method because it increases the validity of case study research (Yin 2004). For the first source of data, an initial document search and examination was undertaken to gain a perspective of what is already known of the Eko-Viikki planning, building and follow-up, as well as the policy instruments used in guiding that process, because the Eko-Viikki project has already been well-documented during and after the planning and construction process. Besides further investigating the main follow-up reports (Helsingin kaupunki and Ympäristöministeriö 2004; Kaupunginsuunnitteluvirasto 2004), the document analysis was extended to include the following documents: the Land-Use and Building Act and documents concerning the City of Helsinki's strategies, master plans and environmental assessments, because these were considered the most influential documents regarding urban planning. In total, 26 documents were selected, being chosen because they either represented developments at the regime level, or directly concerned the planning processes at the niche level in Eko-Viikki.

The second source of data consisted of six semi-structured expert interviews that were carried out and used as a complementary part of the document analysis to include more details about the use of policy instruments, especially the ones used first in Eko-Viikki and later on in the urban planning regime. The interviewees were selected based on their positions in the process of planning, building and follow-up of the Eko-Viikki neighbourhood and more widely of urban planning in Helsinki (see Table 1). Even though the number of interviewees can be considered low, the sample was selected to capture the most relevant stakeholders that were involved in the planning of Eko-Viikki at the time. Five of the interviews were done face-to-face and one via Skype call. The length of the interviews varied from 40 minutes to 55 minutes, and they were conducted during the spring of 2018. All the interviews were done in Finnish and transcribed ad verbatim. The translations into English were done by the authors.

[Table 1. Selection of the interviewees]

The data were analysed using qualitative content analysis. In this type of analysis, the process starts with dividing the analysed text into smaller parts, continues to re-conceptualisation of the text and, in the end, the text is organised into a new entity (Tuomi and Sarajärvi 2018). We structured our analysis into two phases, first the identification of the policy instruments and classification of these instruments according to the MLP framework. Secondly, we focused on how the different regime dimensions of technology, policy, culture and markets, as well as their changes have affected the creation of a possible urban sustainability transition in Helsinki.

For the first part, the policy instruments identified in the documents were classified in line with two principles. Firstly, instruments were classified based on the level of the MLP framework – whether the instruments were applied on a regime or niche level. Secondly, they were grouped according to the mode of governance into hierarchy, market or network. The use and development of these instruments was examined in the policy documents and interviews data in order to examine how they were employed. The results are presented in two different intervals: pre- and construction period 1994-2004, which is based on the document analysis and the post-construction period of 2005-2018, which is based on the interview analysis.

For the second part, the interview data was coded based on the terms in the MLP framework. We focused on the dimensions of the regime, technology policy, culture and markets. The dimension of science was left out from further analysis, because it did not come up in interviews. As the interview material was not extensive, the analysis of the material was done manually by classifying the material under the different dimensions of the regime and finding recurring themes in the interviews. This enabled us to analyse the regime's internal dynamics and to answer how have the different dimensions of the urban planning regime, technology, policy, culture and markets, enabled or constrained a sustainability transition in Helsinki.

4. Results

We have structured our findings into two sections. The first section traces the development and use of different modes of governance in Eko-Viikki during the twentyfour-year period. This is done by examining two different intervals: the pre- and construction period 1994-2004 (section 4.1.1) and the post-construction period of 2005-2018 (section 4.1.2). Section 4.2 then turns the attention towards the urban planning regime and examines how its different dimensions of technology, policy, culture and markets have interplayed with the modes of governance and affected the urban sustainability transition in Helsinki.

4.1.1 Policy instruments used in Eko-Viikki between 1994-2004

At the regime level, the hierarchical mode of governance was dominant between the years 1992 and 2000, as the concept of sustainable development was becoming integrated through amendments to legislation in more than 20 Finnish Acts and Decrees (Helsingin kaupunki 2003) and the master plans

adopted sustainable development as a goal in the 1990s (Jaakkola 2012). Furthermore, the Land Use and Building Act was completely renewed in 1999, which resulted in the principles of sustainable development coming into the law in a more integrated way (Ympäristöministeriö 2014). The first broad environmental impact assessment for a zoning plan in Finland was conducted in the Viikki area (Helsingin kaupunki and Ympäristöministeriö, 2004).

Parallel with the development of a hierarchical mode of governance, a network mode of governance was beginning to emerge at the regime level. This took place as multiple research programmes, both academic and research concerning practical applications, were initiated to gain more information and concrete tools for sustainable urban planning in the 1990s (Helsingin kaupunkisuunnitteluvirasto 2004). In addition, network instruments on the regime level related to Eko-Viikki revolved around building a new kind of network of actors from different fields. This also involved collaboration models between these actors in order to develop sustainable construction and land use (Helsingin kaupunki and Ympäristöministeriö 2004).

At the niche level of Eko-Viikki, novel regulative instruments were designed especially for Eko-Viikki or used in a new way by the city planners (Helsingin kaupunki and Ympäristöministeriö 2004). The detailed plan of the area also included construction practice regulations, which promoted sustainability. Some of the construction practice regulations in Eko-Viikki were binding, while some were only normative principles, advising how the area should be developed. Multiple binding regulations included a requirement to use glazed balconies or green rooms, design principles for yards and green fingers and technical regulations on waste management, ground construction and management of drainage waters. Through these normative principles, for example, the buildings would be built facing south so that the apartments could benefit from natural sunlight. Moreover, experiments with lowering the number of required parking spaces were made, but in the end, the number of parking spaces remained the same as usually allocated.

For the first time, a demand for ecological sustainability was attached to the plot assignment stipulations.¹ When handing over the sites, the City of Helsinki required that the planners and construction companies included experimental construction to promote the ecological sustainability of the projects. The projects required fulfilling the minimum requirement levels of PIMWAG criteria,² following building practice regulations and taking part in the follow-up by monitoring and reporting the results of the construction (Helsingin kaupunki and Ympäristöministeriö 2004). The PIMWAG criteria was a new policy instrument drawn up specifically for the Eko-Viikki area. It defined the minimum levels of sustainability in five areas: pollution, use of natural resources, health, biodiversity and food. These five areas included 16 criteria for the assessment. Each criterion was graded from 0 to 2 based on the sustainability level of the project. The minimum sustainability requirements (= 0 points) were all, except for electricity, already more sustainable than the normal levels for buildings at that time (Helsingin kaupunkisuunnitteluvirasto, 2004; Helsingin kaupunki & Ympäristöministeriö, 2004.)

¹ Oral statement of the Eko-Viikki project coordinator, 20.8.2018.

² Named after the developers.

The market mode of governance did not feature strongly as the use of economic policy instruments was scarce in the Eko-Viikki project, and the project obtained a relatively small funding from the Finnish Funding Agency for Technology and Innovation (Helsingin kaupunki and Ympäristöministeriö 2004). In addition, there were no specific economic instruments supporting the implementation of the criteria (Helsingin kaupunki and Ympäristöministeriö 2004). The City of Helsinki did, however, make some exceptions during the Eko-Viikki development process to ease the additional construction costs.

In terms of the network mode of governance, new collaboration methods were used to engage multiple actors. These included an area working group to steer the area development and provide feedback on the plans. This group consisted of experts from different fields, including the project manager, the planner and architect who issue permits from the city allowing building, the constructor, and the main planner from the construction companies. Planning competitions with sustainability requirements and that promoted multisectoral co-operation were also used (Helsingin kaupunki and Ympäristöministeriö 2004).

Provision of information was a multifaceted process. On the one hand, there was an extensive follow-up of this pioneer project by the City of Helsinki and the Ministry of the Environment (Helsingin kaupunki and Ympäristöministeriö 2004). On the other, there were no formal instruments for disseminating knowledge about the goals and special features of the buildings in the Eko-Viikki construction process. Moreover, the information was not always conveyed to the stakeholders as was planned (Helsingin kaupunki and Ympäristöministeriö 2004). See Table 2 for a summary of the instruments used in Eko-Viikki neighbourhood classified according to a mode of governance and to the multi-level perspective framework.

[Table 2. Urban modes of governance during planning and construction of Eko-Viikki between 1994 and 2004].

4.1.2 Policy instruments used in Eko-Viikki between 2005-2018

Changes in the above-discussed modes between 2005 and 2018 are depicted below and summarised in Table 3. At the regime level, the hierarchical mode has continued to dominate, and regulations have become more stringent over the years at an ever-quicken pace. Above all, energy efficiency requirements and emission reductions have become more central in the zoning and construction fields after the Land Use and Building Act (1999) came into effect (Ympäristöministeriö 2014), as interviewees also noted. In addition, the Land Use and Building Act was amended in 2005 to include the environmental impact assessment as mandatory for land use plans (Land Use and Building Act 202/2005, 9§). This was due to changes, most importantly, in the EU-level Strategic Environmental Assessment directive (Ympäristöministeriö 2017a). More generally, the reform process of the Land Use and Building Act is currently underway in 2018 (Ympäristöministeriö 2018a). The revision focuses on responding to the changing operational environment, which entails such phenomena as climate, energy, low carbon and life cycle issues and digitalisation (Ympäristöministeriö 2018a), demonstrating the influence of the landscape level on the regime.

Even though the interviewee from the Ministry of the Environment stated that the strongest steering instruments for construction are from the energy sector, the official regulations from the state are gradually starting to integrate other issues. The steering is moving towards a more holistic stance in low-carbon building, where the carbon footprint of building materials is now being taken into consideration (H2). Another interviewee (H4) highlighted the rapid pace of change in legislation by stating that, nowadays, regular buildings are more energy efficient than the buildings built in Eko-Viikki. Two interviewees (H4, H5) considered that the Eko-Viikki project showed to the Ministry of the Environment that stricter construction regulations could be achieved by simple solutions, and that developers did not see these demands as excessive. According to H4, it is often difficult to implement tighter regulation if there is no experimentation platform. Overall, the importance of the influence and concrete directives from the EU on national legislation was still acknowledged (H2, H3).

The PIMWAG criteria were thought to be the biggest achievement concerning the Eko-Viikki area development and its innovations at the niche level. In the long run, however, it was considered to be too complicated and laborious to be applied as it was (H5). The initial idea of the criteria was to be a flexible tool that could be updated and developed along with the advancements of scientific knowledge (H6). A simplified version of the criteria was later used in the planning and building of the other parts of Viikki, focusing especially on energy consumption reductions (H5). One interviewee (H1) questioned the need to have separate criteria for assessing the sustainability of buildings in Finland, as there are functional international alternatives, such as Building Research Establishment's Environmental Assessment Method (BREEAM). Unlike PIMWAG, BREEAM does not require heavy and laborious calculations. Interviewee H2 stated that the PIMWAG criteria were further developed into different sustainability indicator tools at the regime level. In fact, a new tool was created to assess and classify the sustainability of both old and new buildings. This tool was based on the experiences of the PIMWAG criteria and the international tools BREEAM and the Leadership in Energy and Environmental Design (LEED), but it did not become widely used. Later on, this tool was further developed into a new RT environmental tool (Building Information in English). The use of these informative indicator tools is not obligatory, but they are considered and employed through different networks. The use of this tool is voluntary, and it focuses mainly on sustainability within buildings. In contrast, the use and the area-level sustainability perspective were mandatory parts of the PIMWAG criteria in Eko-Viikki (Helsingin kaupunki and Ympäristöministeriö, 2004).

Of the policy instruments used in Eko-Viikki, the sustainability criteria in plot assignment stipulations have consequently been used in the Helsinki urban planning processes. Helsinki has, for example, demanded stricter levels of energy efficiency for buildings than what is demanded at the national level (Helsingin kaupunki 2018). On the one hand, interviewees stated that when the land is owned by the city, plot assignment stipulations were effective means to steer building projects in an area towards more ambitious sustainability goals. Furthermore, the interviewees considered the stipulations to be a lighter and more flexible way to steer when compared to, for example, attaching regulations to detailed plans. On the other hand, concerns about the applicability of this method in the future were raised because the procedure is laborious, and there has been a decrease in the city's personnel resources to carry these plans through (H4).

Interviewees confirmed that the area working group practice has also been used later on, and it has become an established part of Helsinki urban planning processes. This is seen as a viable option, especially in construction projects that cover a wider area and are coordinated by project leaders. Although the collaborative area working group was not intended to be a permanent feature of urban planning and was not as organised as in Eko-Viikki, the idea of evaluation meetings of local stakeholders has remained in the city's toolkit (H3). Table 3 shows policy instruments used in Eko-Viikki neighbourhood classified according to a mode of governance and to the multi-level perspective framework.

[Table 3. Changes in urban modes of governance 2005–2018].

4.2 The urban planning regime 1994-2018

This part of the analysis focuses on the different regime parts of *technology*, *policy*, *culture* and *markets* as identified in the MLP framework, and how they interplay with the modes of governance identified above. First, the interviewees considered that the development of *technology* relating to sustainable construction and land use planning was fast paced throughout the years under study (1994–2018). All but one interviewee (H3) mentioned that technology, especially for sustainable construction but also for land use planning, has developed enormously over the last few decades. One interviewee explained that during the planning of Eko-Viikki, the technology was not sufficient for all the planning schemes introduced (H5). In the 1990s, the prices of technological solutions were also high due to the lack of technology providers (H6):

And my thesis here is that we have lived in a society where there was unlimited resources and limited technology. Now we are moving to a society where there are limited resources and unlimited technology. So, this technological development is totally absurd! In the sense that in 10 years, without doing anything, we can make houses that are four times more energy efficient. (H6)

According to the interviewees, advancements in some fields of technology had more of an effect than others. For example, energy production technologies, such as solar panel technology, were mentioned most. One interviewee highlighted this by stating that the solar panel experiments in Eko-Viikki were not considered to be the most successful ones, partially because the technology was so new at that time (H4). Nowadays, sustainability technology solutions are seen as an integrated part of the buildings – not only something added on to conventional buildings (H6). Stormwater management was also mentioned as an issue that is addressed in current urban planning more than in the past (H4). The same interviewee remarked that the development of technology has been even faster in terms of energy production and mobility systems than within the construction sector.

Second, the interviewees considered that developments in the *policy* dimension affected the Helsinki urban planning transition in multiple ways. At the practical urban planning level, hopes were high that Eko-Viikki development would lead to similar sustainable neighbourhood projects with high

ambitions. However, half of the interviewees pointed out that since Eko-Viikki, there have not been any further examples of this type of experiment:

...It turned out, for the city, that this was this kind of experiment and then we maybe went a little backwards because this kind of criteria was not developed elsewhere. This Kuninkaantammi [a new neighbourhood currently under development] is the next of this kind that has started to develop especially the ecological construction side. (H3)

Furthermore, it seems that sustainability issues have not yet been mainstreamed to everyday work in urban planning. An interviewee from the Urban Environment Division of the City of Helsinki (H4) stated that the people inside the planning department have different levels of interest and know-how regarding the integration of sustainability issues into their work. According to the interviewee, the urban planning department has not had general guidance or tools on how to integrate sustainability into the planning work (H3). Nevertheless, sustainability issues have slowly started to become part of the everyday work in urban planning as a new generation of employees, already exposed to sustainability issues in their studies, have entered the field (H4).

At the same time, according to the interviewees, political agendas have become increasingly ambitious. Interviewees stated that the City of Helsinki has compiled and been committed to ambitious sustainability goals at the political level in recent years.

...We have carried out an environmental programme and climate programme that set huge goals by the year 2030. The attainment of these goals demands participation of the whole city organisation and also to a lesser extent the inhabitants themselves. (H4)

Furthermore, the ideology of urban sustainability planning has changed over the years (H4). The interviewee said that the Eko-Viikki project in the 1990s represented the old ideology of a green and sparsely populated eco-city with sustainability technologies attached, whereas now sustainability of the city consists of features such as density and eco-efficiency. The discussion in the urban planning field has turned into the promotion of climate-smart cities rather than eco-cities.

Moreover, the interviewees (H3–H5) that had worked on urban planning inside the City of Helsinki raised the issue of complexity in urban planning. Urban planning was seen to involve constant balancing among different goals with different time spans. The short-term goals of maintaining the level of current services and industrial policy might be contrary to the long-term goals of sustainability of the city:

Helsinki has challenges in how we grow sustainably – in a qualitatively sustainable way. It's a challenge for all of us. I believe we can make it, but it requires that everyone understands how long-term investments are made. (H4)

Interviewees stated that compromises must inevitably be made in decisions concerning different dimensions of sustainability. The goal of a dense city might create difficulties in developing systems

for stormwater management. Leaving room for recreational green areas inside the city was controversial with regard to reducing energy use created by the city structure.

But now that we build in a compact manner, infiltrations are no longer possible. And then, on the other hand, compact building results in dense city structure and shorter distances and services closer and traveling diminishes. There are things that are opposites, some are bigger and others smaller... . (H3)

Furthermore, the interviewees pondered which types of policy instruments have the biggest impact on sustainability and which organisations have the most power in initiating them. The city council, the city government and the municipal boards were seen as the actors that have the biggest impact on the decisions urban planning because they accept the plans and make budget decisions (H5). These governmental bodies are also responsible for more strategic-level decisions, such as different development programmes regarding sustainable means of mobility or city boulevards that affect the whole city and therefore have the biggest impact because they influence the already existing areas (H4). Similarly, improving the energy efficiency of old buildings was seen as a more urgent need than focusing on new constructions that were already designed according to stringent energy efficient standards.

...Of course, we demand and require these (sustainability requirements), but... . So little new floor space is being generated in a year that the new construction changes the city very slowly. For that reason, I believe that the things that steer the city development most are those things that affect the whole city structure. Traffic system-level things and mobility and such affect how the already existing urban areas can be developed. (H4)

The importance of decisions that account for the issue more broadly and cover the whole system, was discussed. Interviewee H4 thought that steering the new construction projects was a small-scale action. The action of densifying the existing built-up areas was also seen to be important.

The importance of the city's own role was raised by interviewees when considering the power of the City of Helsinki to influence energy production. The energy company, Helen, is owned by the city and, therefore, the City of Helsinki has the power to make energy production more sustainable, i.e. self-steer.

...I talk quite a lot about the energy efficiency of buildings because it is central. Through that you can see that many other things are only things that have an effect on the surface... I believe that we are exceptional in Europe, in Helsinki for example, in how large a number (of houses) have a district heating in use. After all, as Helen is a public utility, Helen's actions are in the hands of Helsinki [city]. Those definitions of policy that politicians make concerning that, and how we get to those, really has a big influence... . Then, on the other hand, there's also the good old energy efficiency. Neither of these issues is related to zoning matters as such... They're very central issues concerning emissions. (H4)

Finally, *culture* and *markets* were considered to be intertwined and difficult to change. Interviewees acknowledged that the city cannot carry out urban sustainability changes by itself. Neighbourhood sustainability goals need to be supported by maintenance phase actors and by citizens' behaviour. The interviewees said that this was already noticeable in the Eko-Viikki follow-up results (referring to: Helsingin kaupunkisuunnitteluvirasto, 2004; Helsingin kaupunki & Ympäristöministeriö, 2004), which showed significant differences between the consumption levels of water, electricity and heating consumption within the area. The reasons for this difference among different houses in Eko-Viikki were misuse or simply the residents and the house managers not using the technology provided (H5). One interviewee (H3) stated that the best way to reduce consumption levels is to have people pay for their own water and electricity. All in all, interviewees emphasised sufficient knowledge and attitudes as significant factors in the maintenance and user phases.

The importance of communication through the maintenance phase also emerged in the interviews. The responsibility of construction companies to inform the real estate manager and their responsibility, in turn, to pass on the information to the maintenance companies and to their changing staff was not regarded as successful in Eko-Viikki. According to the interviewees, construction developers often think that the maintenance phase is no longer their responsibility:

...It was found out in the follow-up (2004) that the maintenance of the property is very important. There was an attempt to arrange training for the real estate managers in the early phase, but the turnover (of maintenance staff) is very high. When the next janitor comes there, he hasn't necessarily heard that those (buildings) have something special about them. (H5)

As far as the topic of markets is concerned, there was no consensus among the interviewees whether sustainable construction is seen as a good selling strategy by the construction companies or not. One respondent (H4) said that energy-efficient and climate-smart construction is seen as an advantage from the construction companies' point of view, but another respondent (H6) stated that the companies do not want to take the risk of doubled planning expenses should the project plan containing new sustainability solutions not be accepted in the first round. The same interviewee (H6) stated that customers still see sustainability as expensive and are not interested in investing in it.

Furthermore, the construction industry was seen as an obstructive actor. Most of the interviewees spoke about the construction industry's tendency to stick to their old patterns, as well as the tendency to make the maximisation of profits their first priority. Most companies were said to implement the construction work only with the mandatory minimum requirements.

...If there is something that the regulations don't demand, then it is very hard to realise. The tradition in the construction industry in our country is that regulations are the concern of the authorities. When it is written in the law, decrees and regulations, then it's carried out. That kind of, like, going beyond the basic level you don't really see. (H1)

In the case of Eko-Viikki, the hopes were high in the sense that construction companies would, after the project, start further developing sustainable building innovations, but interviewees did not think that this had happened. To address this challenge, regulations were seen as a vital element in steering the industry towards a more sustainability-oriented future. However, one interviewee commented that despite all the claims of being conservative, the construction industry had tried to address the challenges of rising sustainability targets and had somewhat developed the methods of the field in recent years (H4).

5. Discussion

The results of this study indicate that examining modes of governance within the urban regime, and especially with a focus on policy instruments, unveils the dynamics of governing possible urban sustainability transitions. First of all, according to the results, niche-level policy experimentations have the potential to affect the regime and its current practices, including when change has been initiated by the regime actors. The findings also show how different regime dimensions interplay with each other, as well as the interaction between niche and regime levels

On the one hand, in terms of the modes of governance, the hierarchical and network mode of governance were considered to have influenced the niche experiment the most and two policy instruments have been scaled up for use in urban planning in Helsinki. The plot assignment stipulations were found to be a flexible but strong policy instrument to promote sustainability. These stipulations were thought to be more flexible steering mechanisms than attaching more regulations to the detailed plan to guide the sustainability of the area and its buildings. Since then, stipulations have been used in urban planning more widely in Helsinki, requiring even stricter sustainability actions than those demanded by national-level regulations. In Helsinki, the city is the largest landowner, as roughly 60% of all construction takes place on city-owned and transferred sites (Helsingin kaupunki 2018) so the city can set the conditions. While this allows the city to yield regulative power, this may not be the case in other cities, where sustainability goals cannot be guaranteed in this way. In terms of additional instruments, the sustainability indicator tool, PIMWAG criteria, was successfully used as part of the stipulations, and contributed to the development of further tools. The indicator assessment procedures have not, however, become mainstream because they always demand extra resources compared to normal construction, despite this case demonstrating that the application of stricter regulations is possible.

In terms of the network mode of governance, the area working group, namely the policy instrument focusing on collaboration methods, was discovered to be a viable policy instrument to steer an urban planning project with sustainability aims. Hence, the method has become a part of Helsinki urban planning practices, especially in area construction projects. This need has also been observed by Loorbach and Shiroyama (2016), who state that policy instruments used for promoting urban sustainability transitions should take into account more the wide range of people and interests involved in the process. In terms of the market mode of governance, it is notable that the use of economic policy instruments was minimal and focused only on a few funding instruments. The lack of funding and other economic instruments might be explained by earlier research findings (Loorbach

and Shiroyama, 2016), namely that current urban governance still chooses short-term economic growth over sustainability aims.

On the other hand, our analysis demonstrates the complexity of urban planning regime transitions, as also noted in the literature (Martínez et al. 2016). The multiple parts of a regime – technology, policy, science, culture and markets – have their own development paths and these are also affected by the landscape. In this case, the regime shows the increasingly rapid development of technologies that can be used in construction, a general move towards more stringent requirements for policy in terms of sustainability and energy efficiency, and the need for increased communication and the sharing of information in terms of changing the culture of consumption towards low-impact lifestyles. Markets were seen as vital in relation to the construction industry, where developers were seen to be a powerful actor that can often challenge existing regulations, and resist further requirements for sustainability and be granted exemptions. This power imbalance between actors has been noted as important when examining transitions (Avelino and Wittmayer, 2016).

When examined together, it appears that the policy dimension within the regime overall was supportive in the local implementation of the modes of governance within the niche. The urban planning regime, with its increasing goals for sustainability, utilised the hierarchical mode in pursuing those goals, while also allowing for the collaborative area working group to emerge as an innovation. However, no further examples of this type of a niche level eco-neighbourhood experiment followed in Helsinki. Other dimensions of the regime, most notably technology and culture, were seen to support the transition or at least provided conditions for it. However, the market dimension was seen to resist change, with the construction industry in particular being identified as an obstructing actor. This, together with the absence of the market mode of governance, may explain why further niche experiments have not sprung up in Helsinki driven solely by the private construction sector.

The outcome of the transition is not automatically guaranteed, even if the modes of governance support the change at the niche level. Besides a couple of clearly viable policy instruments scaling up to the regime, the use of policy instruments in the Eko-Viikki neighbourhood development did not always lead to desired results, despite the overall tightening of regulations at the regime level. One of the most notable challenges in the Eko-Viikki process was a lack of accurate information-related policy instruments for the dissemination of knowledge throughout the long chain of stakeholders in the area development. These findings support the earlier findings of Staffans and Väyrynen (2009) that demonstrate that communication is interrupted in several phases in the Finnish land use planning system because it is executed more as individual projects than processes. Systemic and process focused policy instruments are needed to address this.

An area development project depends on individual people, who might change during the process (Staffans and Väyrynen, 2009). This was the case after the construction of Eko-Viikki; when the janitors changed, the new employees did not have sufficient knowledge about the special technology. Furthermore, Staffans and Väyrynen (2009) state that if the area development is treated as a project, learning new approaches is also targeted mainly at individuals. The culture within the construction industry was seen as conservative, and most companies implemented only the mandatory sustainability requirements. These two examples highlight the need to pay more attention to the actors

in transitions and the power that they have in terms of affecting change (Avelino and Wittmayer 2016, Fischer and Newig 2016).

Furthermore, the results indicate that regime actors can have endogenous power to some extent steer the urban sustainability transitions. The urban planning regime actors in Helsinki were active in the Eko-Viikki project, and sustainability issues have become a more integrated part of everyday urban planning. Quitzau et al. (2013) state that urban governments have an endogenous agency in regime enactment, and urban-scale regimes can be strategically fruitful rather than paralysing. A key challenge is to abandon the tendency to conceptualise cities as being merely sites for receiving transition initiatives (Hodson and Marvin, 2010). Thus, the need to develop more agency-oriented transition perspectives is particularly important in urban sustainability transitions (see e.g. Hodson and Marvin 2010; Quitzau et al. 2013 Hendriks 2014). As Loorbach and Shiroyama (2016) state, it is clear that no single governance structure or national, regional or local level can solve global sustainability issues on their own. Urban sustainability solutions are needed both from bottom-up innovations as well as from higher-level, top-down policies.

The policy instruments used in urban sustainability transitions should, indeed, take into consideration the complexities and uncertainties, long-time horizon and wide range of people and interests involved in the process (Loorbach and Shiroyama, 2016). To address the above-mentioned issue of private market interest, urban sustainability transition processes need support from higher-level actions, such as national-scale regulations and wider political-economic structures and mechanisms that drive sustainable lifestyles (Næss and Vogel, 2012).

6. Conclusion

This paper presents an empirical case study that examines the modes of governance within an urban planning regime over a twenty-year period and discusses the role of policy instruments in the context of urban sustainability transitions. The case shows how the regime supports the use of hierarchical and network modes of governance and how some of these policy instruments are scaled up. The different dimensions of the regime condition and structure the modes of governance by creating the conditions within which regime actors make decisions. This study highlights the need to further examine the role of actors within transitions and how their role is important at the niche, as well as at the regime level.

As the need for urban sustainability transitions has become more pressing, there is also a need to pose new research questions to take the field forward. Overall, there is a clear need for more empirical and longitudinal case examples to further analyse and theorise the role of the regime and its internal dynamics in urban sustainability transitions. Furthermore, while individual case studies offer explanations of the dynamics of transitions and are helpful to hone the theory of transitions, there is also a need for more comparative and larger sample of case studies to examine to what extent urban areas are moving towards more sustainable planning outcomes. Larger samples that enable comparisons can also introduce more information about the context-specificity of these governance solutions and about the possibilities of using workable solutions elsewhere.

7. References

- Avelino, F., & Wittmayer, J. M. 2016. Shifting power relations in sustainability transitions: a multi-actor perspective. *Journal of Environmental Policy & Planning* 18(5): 628-649
- Bai, X., Surveyer, A., Elmqvist, T., Gatzweiler, F. W., Güneralp, B., Parnell, S., Prieur-Richard, A.H., Shrivastava, P., Siri, J.G., Stafford-Smith, M., Toussaint, J. P. and Webb, R. 2016. Defining and advancing a systems approach for sustainable cities. *Current Opinion in Environmental Sustainability* 23: 69-78. doi: 10.1016/j.cosust.2016.11.010
- Bulkeley, H. 2010. Cities and the governing of climate change. *Annual Review of Environment and Resources* 35: 229-253.
- Bulkeley, H., Betsill, M. 2005. Rethinking sustainable cities: multi-level governance and the 'urban' politics of climate change. *Environmental Politics* 14 (1): 42–63.
- Daneri, D. R., Trencher, G. and Petersen, J. 2015. Students as change agents in a town-wide sustainability transformation: the Oberlin Project at Oberlin College. *Current Opinion in Environmental Sustainability* 16: 14-21.
- Denzin, N. K. 2007. Triangulation. *The Blackwell Encyclopedia of Sociology*. DOI: 10.1002/9781405165518
- Eames, M., Dixon, T., May, T., and Hunt, M. 2013. City futures: exploring urban retrofit and sustainable transitions. *Building Research and Information* 41(5): 504-516.
- Ernst, L., de Graaf-Van Dinther, R. E., Peek, G. J., and Loorbach, D. A. 2016. Sustainable urban transformation and sustainability transitions; conceptual framework and case study. *Journal of Cleaner Production* 112: 2988-2999.
- Ernstson, H., Van der Leeuw, S. E., Redman, C. L., Meffert, D. J., Davis, G., Alfsen, C., Elmqvist, T. 2010. Urban transitions: on urban resilience and human-dominated ecosystems. *Ambio* 39(8): 531-545.
- Fischer, L. B., Newig, J. 2016. Importance of actors and agency in sustainability transitions: a systematic exploration of the literature. *Sustainability* 8(5): 476.
- Frantzeskaki, N., Broto, V. C., Coenen, L., & Loorbach, D. (Eds.). 2017. *Urban sustainability transitions* (Vol. 5). London, Taylor & Francis.
- Geels, F. W. 2002. Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research Policy*, 31(8-9): 1257-1274.
- Geels, F. W. 2004. From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy* 33(6-7): 897-920.
- Geels, F. W. 2006. The hygienic transition from cesspools to sewer systems (1840–1930): The dynamics of regime transformation. *Research Policy* 35(7): 1069-1082.
- Geels, F. 2010. The role of cities in technological transitions: analytical clarifications and historical examples. In Harriet Bulkeley, Vanesa Castán Broto, Mike Hodson, Simon Marvin (Eds.) *Cities and Low Carbon Transitions* (pp. 29-44). Abingdon, Routledge.
- Geels, F. W. 2011. The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions* 1(1): 24-40.
- Geels, F. W. and Schot, J. 2007. Typology of sociotechnical transition pathways. *Research Policy* 36(3): 399-417.

- Helsingin kaupunki (2015). *Helsingin ilmastotiekartta- kohti hiilineutraalia ja ilmastoon sopeutunutta kaupunkiamme*. Available at: <https://dev.hel.fi/paatokset/media/att/c0/c08ed49dbad17914212107a8242a3f17c462f6b4.pdf> (accessed 5.10.2018).
- Helsingin kaupunki, 2018 *Hiilineutraali Helsinki 2035 -toimenpideohjelma. Helsingin kaupungin keskushallinnon julkaisuja* 2018:4. Available at: <https://www.hel.fi/static/liitteet/kaupunkiymparisto/julkaisut/julkaisut/HNH-2035-toimenpideohjelma.pdf>
- Helsingin kaupunki & Ympäristöministeriö 2004. *Eko-Viikki -Tavoitteet, toteutus ja tulokset*. Available at: https://www.uuttahelsinkia.fi/sites/default/files/legacy_files/eko-viikki.pdf (accessed 17.1.2019)
- Helsingin kaupunkisuunnitteluvirasto 2004. *Eko-Viikki seurantaprojektin loppuraportti*. Helsingin kaupunkisuunnitteluviraston julkaisuja 10.
- Helsingin kaupunkiympäristön toimiala (2018). *Helsingin kaupungin ympäristöraportti 2017*. Helsingin kaupungin keskushallinnon julkaisuja 2018:7. Available at: <https://www.hel.fi/static/ymk/yrp/fi/hki-ymparistoraportti-2017.pdf> (accessed 5.10.2018).
- Heiskanen, E., Nissilä, H. and Lovio, R. 2015. Demonstration buildings as protected spaces for clean energy solutions—the case of solar building integration in Finland. *Journal of Cleaner Production* 109: 347-356.
- Hendriks, F. 2014. Understanding good urban governance: Essentials, shifts, and values. *Urban Affairs Review*, 50(4): 553-576.
- Hodson, M., Geels, F. W. and McMeekin, A. 2017. Reconfiguring urban sustainability transitions, analysing multiplicity. *Sustainability* 9(2): 299.
- Hodson, M., & Marvin, S. 2009. Cities mediating technological transitions: Understanding visions, intermediation and consequences. *Technology Analysis & Strategic Management* 21(4): 515-534.
- Hodson, M. and Marvin, S. 2010. Can cities shape socio-technical transitions and how would we know if they were? *Research Policy* 39(4): 477-485.
- Hölscher, K. 2019. *Transforming urban climate governance. Capacities for transformative climate governance*. Rotterdam, Erasmus University Rotterdam.
- Hooghe, L. and Marks, G. 2003. Unraveling the central state, but how? Types of multi-level governance. *American Political Science Review* 97(2): 233-243.
- Jaakkola, M. 2012. Helsinki, Finland: Greenness and Urban Form. In: Beatley, T. (2012). *Green cities of Europe: global lessons on green urbanism*. Island Press.
- Jabareen, Y. R. 2006. Sustainable urban forms - their typologies, models, and concepts. *Journal of Planning Education and Research* 26(1): 38-52.
- Joss, S. 2011. Eco-cities: The mainstreaming of urban sustainability - key characteristics and driving factors. *International Journal of Sustainable Development and Planning* 6(3): 268-285.
- Joss, S. 2015. Eco-cities and sustainable urbanism. In J. D. Wright (Ed.), *International Encyclopedia of the social & Behavioral sciences* (second edition) (pp. 829-837). Oxford: Elsevier.

- Khan, J. 2013. What role for network governance in urban low carbon transitions? *Journal of Cleaner Production* 50: 133-139.
- Kooiman, J. (Ed.). 1993. *Modern governance: new government-society interactions*. London, Sage.
- Loorbach, D and Shiroyama, H. 2016. The challenge of sustainable urban development and transforming cities. *Governance of Urban Sustainability Transitions* (pp. 3-12) Dordrecht, Springer.
- Loorbach, D., Wittmayer, J. M., Shiroyama, H., Fujino, J., & Mizuguchi, S. 2016. *Governance of urban sustainability transitions*. Berlin, Heidelberg, Springer.
- Martínez, J. G., Boas, I., Lenhart, J., and Mol, A. P. 2016. Revealing Curitiba's flawed sustainability: How discourse can prevent institutional change. *Habitat International* 53: 350-359.
- McCann, E. 2017. Governing urbanism: Urban governance studies 1.0, 2.0 and beyond. *Urban Studies* 54(2): 312-326.
- Mickwitz, P. 2003. A framework for evaluating environmental policy instruments: Context and key concepts. *Evaluation* 9(4): 415-436.
- Næss, P. and Vogel, N. 2012. Sustainable urban development and the multi-level transition perspective. *Environmental Innovation and Societal Transitions* 4: 36-50.
- O'Brien, K. and Sygna, L. 2013. Responding to climate change: the three spheres of transformation. *Proceedings of Transformation in a Changing Climate*, 19-21.
- Quitau, M., Jensen, J. S., Elle, M. and Hoffmann, B. 2013. Sustainable urban regime adjustments. *Journal of Cleaner Production* 50: 140-147.
- Raven, R., Schot, J., & Berkhout, F. 2012. Space and scale in socio-technical transitions. *Environmental Innovation and Societal Transitions* 4: 63-78.
- Rotmans, J., Kemp, R., and Van Asselt, M. 2001. More evolution than revolution: Transition management in public policy *Foresight* 3(1): 15-31.
- Scholz, M., Hedmark, Å. and Hartley, W. 2012. Recent advances in sustainable multifunctional land and urban management in Europe: A review. *Journal of Environmental Planning and Management* 55(7): 833-854.
- SeutuCD 2018. Helsingin seudun ympäristöpalvelut HSY ja Helsingin kaupungin kuntarekisteri, kaupunginkanslian kaupunkitutkimus ja -tilastot.
- Shane, A. M., and Graedel, T. E. 2000. Urban environmental sustainability metrics: a provisional set. *Journal of Environmental Planning and Management* 43(5): 643-663.
- Smith, A., Stirling, A. and Berkhout, F. 2005. The governance of sustainable socio-technical transitions. *Research policy* 34(10): 1491-1510.
- Staffans, A. & Väyrynen, E. (Eds.) 2009. Oppiva kaupunkisuunnittelu. Arkkitehtuurin julkaisu, no.98, Espoo. Available at: http://opus.tkk.fi/dokumentit/Tulokset_dokumentit/OPUS-kirja_web.pdf (accessed 9.10.2018)
- Swilling, M., Hajer, M. 2017. Governance of urban transitions: towards sustainable resource efficient urban infrastructures. *Environmental Research Letters* 12(12): 1-8, doi:10.1088/1748-9326/aa7d3a
- Tenbelsel, T. 2005. Multiple modes of governance: Disentangling the alternatives to hierarchies and markets. *Public Management Review* 7(2): 267-288.
- Treib, O., Bähr, H., & Falkner, G. 2007. Modes of governance: towards a conceptual clarification. *Journal of European Public Policy* 14(1): 1-20.

- Tuomi, J. and Sarajärvi, A. 2018. *Laadullinen tutkimus ja sisällönanalyysi*. Kustanneosakeyhtiö Tammi.
- van der Heijden, J., Patterson, J., Juhola, S., & Wolfram, M. 2019. Advancing the role of cities in climate governance – promise, limits, politics. *Journal of Environmental Planning and Management* 62(3): 365-373.
- Vedung, E. 1998. Policy instruments: Typologies and theories. In: Bemelmans-Videc, M.L., Rist, R.C. and Vedung, E. (Eds.): *Carrots, Sticks & Sermons: Policy Instruments and Their Evaluation*. News Brunswick: Transaction Publishers 1998.
- Yin, R.K. 2014. *Case Study Research: Design and Methods*. Fifth edition. SAGE Publications, Inc.
- Ympäristöministeriö 2014. Arvio maankäyttö- ja rakennuslain toimivuudesta. Suomen Ympäristö 1/2014. Available at: [http://www.ym.fi/fi-FI/Ajankohtaista/Julkaisut/SY_12014_Arviointi_maankaytto_ja_rakennu\(28185\)](http://www.ym.fi/fi-FI/Ajankohtaista/Julkaisut/SY_12014_Arviointi_maankaytto_ja_rakennu(28185)) (accessed 21.1.2019)
- Ympäristöministeriö 2018a. Maankäyttö- ja rakennuslain uudistus. Available at: [http://www.ym.fi/fi-FI/Maankaytto_ja_rakentaminen/Lainsaadanto_ja_ohjeet/Maankayton_ja_rakentamisen_valmisteilla_oleva_lainsaadanto/Maankaytto_ja_rakennuslain_uudistus/Maankaytto_ja_rakennuslain_uudistus\(42391\)](http://www.ym.fi/fi-FI/Maankaytto_ja_rakentaminen/Lainsaadanto_ja_ohjeet/Maankayton_ja_rakentamisen_valmisteilla_oleva_lainsaadanto/Maankaytto_ja_rakennuslain_uudistus/Maankaytto_ja_rakennuslain_uudistus(42391)) (accessed 22.8.2018)